TABLE 2.—*Free-air resultant winds (meters per second) based on pilot-balloon observations made near 6 a. m. (E. S. T.) during March 1935*—Continued

[Wind from N=360°, E=90°, etc.]

Altitude (m) m. s. l.	Newark, N. J. (14 m)		Oakland, Calif. (8 m)		Oklahoma City, Okla. (402 m)		Omaha, Nebr. (306 m)		Pearl Harbor, Territory of Hawaii [1] (68 m)		Pensacola, Fla.[1] (24 m)		St. Louis, Mo. (170 m)		Salt Lake City, Utah (1,294 m)		San Diego, Calif. (15 m)		Sault Ste. Marie, Mich. (198 m)		Seattle, Wash. (14 m)		Spokane, Wash. (603 m)		Washington, D. C. (10 m)	
	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity
	°		°		°		°		°		°		°		°		°		°		°		°		°	
Surface	320	1.2	156	0.7	178	2.9	134	1.0	34	1.4	81	1.4	197	1.5	168	3.6	15	0.4	330	0.2	178	3.3	157	0.9	194	0.9
500	292	4.4	281	2.4	198	6.6	193	1.3	67	2.4	189	3.2	215	4.5	-----	-----	280	1.7	360	0.9	202	6.0	-----	-----	231	6.2
1,000	293	8.6	305	3.3	235	11.5	256	4.7	86	0.8	206	4.1	253	8.6	-----	-----	289	2.7	286	2.6	195	4.8	226	4.4	256	7.6
1,500	285	11.7	296	4.0	245	11.3	268	6.8	216	2.3	231	4.3	261	8.3	174	5.0	282	2.8	303	4.1	221	3.8	235	6.1	267	10.2
2,000	280	15.0	297	4.8	256	11.3	276	8.6	230	3.4	242	4.3	262	10.0	199	5.3	262	3.3	289	7.0	259	2.6	244	6.9	298	11.5
2,500	282	13.0	304	5.5	263	12.1	271	9.8	261	3.6	227	3.7	279	9.4	235	4.9	464	4.1	287	8.6	297	3.3	249	6.2	297	11.1
3,000	299	11.2	321	6.2	274	9.3	261	10.9	242	3.6	261	3.6	298	12.1	264	6.3	275	4.0	277	9.5	299	4.3	270	7.6	295	12.3
4,000	-----	-----	323	10.4	312	11.9	234	15.4	207	6.3	242	5.1	274	12.8	273	10.1	275	5.8	290	14.5	306	8.7	298	7.4	323	16.3
5,000	-----	-----	318	5.8	298	11.0	-----	-----	-----	-----	-----	-----	-----	-----	290	10.5	64	2.3	270	25.0	-----	-----	302	13.2	-----	-----

[1] Navy stations.

RIVERS AND FLOODS

[River and Flood Division, MONTROSE W. HAYES, in charge]

By RICHMOND T. ZOCH

There were numerous overflows in the rivers of the eastern half of the United States during March 1935. Fortunately, most of these overflows were of minor consequence.

The Tombigbee and Black Warrior Rivers reached high stages; but relatively little damage resulted, since little planting had been done.

In the Pearl and Pascagoula River systems severe floods occurred. Heavy rains fell over these watersheds from the 4th to the 7th, and light to moderate rains continued through the 12th. These rains caused flood stages at every gage station on these rivers, with severe flood conditions in the Pearl River above Columbia, Miss., and in the Chickasawhay and Leaf Rivers. Jackson, Miss., suffered more than any other locality in these watersheds; at Jackson the water reached a stage of 35.2 feet, which was within 2 feet of the highest stage of record and exactly equal to the crest stage of the December 1932, flood. However, because of the fact that this recent flood was in spring rather than in winter, the losses were considerably greater. Timely warnings were issued for these floods. Reports from the various interested people and organizations after the subsidence of the floods indicate that the warnings were more generally heeded than ordinarily, and resulted in an unusually large saving of property and livestock. Lumber companies, especially, made good use of the warnings, and moved large amounts of logs and lumber to higher ground, in addition to moving equipment out of the swamps and lowlands.

High water occurred in the upper Mississippi River, but flood stage was not reached at any gage station. However, apprehension was felt because of the dams under construction there. When the Weather Bureau advised that high water would occur, the cofferdams were reinforced, and no damage was caused to any of the construction projects on the locks and dams.

A very high flood occurred in the Meramec River in Missouri. Notwithstanding the unusually high water, flood losses were not very large. The flood, coming early in the spring, caused much less damage to crops than it would have caused a month or two later.

An ice gorge formed in the Missouri River about 5 miles below Sioux City, Iowa, on the night of the 6–7th. The gorge caused some apprehension, but as the river was low only slight damage resulted.

The flood in the Ohio River was not of serious proportions, and the damage was comparatively small.

In Arkansas and southern Missouri, there were severe floods in the White and St. Francis River systems. At Poplar Bluff, Mo., on the Black River, Georgetown, Ark., on the White River, and Fisk, Mo., and St. Francis, Ark., on the St. Francis River, the flood waters reached higher stages than ever previously recorded.

Several breaks occurred in the St. Francis River levees. In all, 62 breaks occurred, varying in width from 40 to 400 feet. It is estimated that 175,000 acres of land were flooded by the St. Francis flood; the flooded area was situated in Butler, Stoddard and Dunklin Counties of Missouri, and Clay, Greene, Craighead, and Mississippi Counties of Arkansas. Many farmers fled, abandoning household goods, livestock, etc. Four companies of the Missouri National Guard were called out and sent to the flooded area to preserve order and assist the flood-stricken people. The Red Cross assisted 25,000 flood refugees. Four persons were drowned.

Comments on the floods in the Yazoo and Tallahatchie Rivers in Mississippi, and in the Lower Mississippi River and Green River in Kentucky, will be made in a later issue of the MONTHLY WEATHER REVIEW.

Besides the floods in the streams where flood service is maintained, there were severe local floods in small streams as follows:

In the upper Tug Valley of West Virginia there was an unprecedented flood. The railroad between Bluefield and Welch was out of service for over 2 weeks, and much damage was done to highways.

At Sebewaing, Mich., on the Sebewaing River, there was an ice gorge that caused flooding with much damage to property.

The melting of the heavy snow cover in the northern portion of Wisconsin caused rapidly rising waters in all the small streams of that state from the 22d to 25th. Attendant ice gorges caused many overflows, with considerable damage to highways.

Table of flood stages in March 1935

[All dates in March unless otherwise specified]

River and station	Flood stage	Above flood stages—dates From—	Above flood stages—dates To—	Crest Stage	Crest Date
ST. LAWRENCE DRAINAGE					
	Feet			*Feet*	
Grand: Grand Rapids, Mich	11	7	8	11.2	7
Flint: Columbiaville, Mich	8	6	7	10.3	7
		11	12	9.2	12
Cass:					
Vassar, Mich	13	6	6	14.7	6
Bridgeport, Mich	15	7	7	16.8	7
		5	6	9.4	5
Pine: Alma, Mich	6	12	13	6.4	13
		17	20	7.9	18
		7	9	12.4	8
Tittabawassee: Shields, Mich	10	11	13	11.3	13
		17	24	14.1	19
ATLANTIC SLOPE DRAINAGE					
Mohawk: Tribes Hill, N. Y	23	7	7	25.0	7
Susquehanna:					
Oneonta, N. Y	12	7	7	12.6	7
Bainbridge, N. Y	11	7	7	11.9	7
James:					
Columbia, Va	10	13	17	18.8	13
		26	30	16.3	27
Richmond, Va	8	14	15	9.0	14
Roanoke:					
Randolph, Va	18	14	14	22.4	14
Weldon, N. C	31	14	16	37.0	15
		28	29	34.8	28
Williamston, N. C	10	19	(1)	10.9	21
Tar: Greenville, N. C	12	29	(1)	12.8	31
Neuse:					
Neuse, N. C	13	14	14	13.3	14
		27	29	14.5	28
Smithfield, N. C	12	14	16	13.5	14
		27	30	14.8	29
Cape Fear: Lock No. 2, Elizabethtown, N. C	20	1	2	22.0	1
		14	17	25.6	15
		27	30	25.3	28
Peedee:					
Cheraw, S. C	30	14	15	32.8	15
		27	28	35.1	27
Mars Bluff Bridge, S. C	17	16	21	18.9	18
		29	(1)	(1)	(1)
Poston, S. C	18	21	23	18.0	21–23
Saluda:					
Pelzer, S. C	6	12	12	9.0	12
Chappells, S. C	13	13	14	16.0	14
Broad: Blairs, S. C	14	13	14	15.7	14
Catawba: Catawba, S. C	11	13	13	11.0	13
Wateree: Camden, S. C	24	14	14	24.0	14
Santee:					
Rimini, S. C	12	2	2	12.0	2
		14	24	13.8	17
Ferguson, S. C	12	16	25	13.5	20
Savannah: Ellenton, S. C	14	14	20	20.8	16
Ocmulgee: Macon, Ga	18	13	13	18.6	13
Altamaha: Charlotte, Ga	12	23	23	12.1	23
EAST GULF OF MEXICO DRAINAGE					
Apalachicola: Blountstown, Fla	15	9	13	17.8	11
		15	20	17.8	17
Coosa: Gadsden, Ala	20	14	15	20.5	14
Cahaba: Centerville, Ala	23	7	7	28.0	7
Alabama:					
Montgomery, Ala	30	9	10	31.0	9
		14	16	31.2	15
Selma, Ala	35	9	12	36.8	10
		15	16	35.5	16
Millers Ferry, Ala	40	10	18	43.7	13
Black Warrior: Lock No. 10, Tuscaloosa, Ala	46	6	9	58.8	7
		13	15	54.5	14
Tombigbee:					
Aberdeen, Miss	34	13	15	34.6	14
Lock No. 4, Demopolis, Ala	39	7	28	59.2	18–19
Lock No. 3, Ala	33	6	(1)	58.5	19
Lock No. 2, Ala	46	7	29	59.7	20
Lock No. 1, Ala	31	6	(1)	41.0	23
Leaf: Hattiesburg, Miss	18	8	11	22.8	9
Chickasawhay:					
Enterprise, Miss	20	6	10	30.6	8
Shubuta, Miss	26	7	16	37.6	10
Pascagoula: Merrill, Miss	22	9	20	25.9	13
Bogue Chitto: Franklinton, La	12	8	9	13.8	8
Pearl:					
Edinburg, Miss	20	6	17	26.2	8
Jackson, Miss	18	5	27	35.2	12
Monticello, Miss	15	6	28	26.3	16
Columbia, Miss	17	7	29	24.9	18
Pearl River, La	12	9	(1)	16.2	22

Table of flood stages in March 1935—Continued

River and station	Flood stage	Above flood stages—dates From—	Above flood stages—dates To—	Crest Stage	Crest Date
MISSISSIPPI SYSTEM					
Upper Mississippi Basin					
	Feet			*Feet*	
Chippewa: Durand, Wis	11	24	27	12.7	25
Wisconsin:					
Knowlton, Wis	12	22	28	18.9	22
Wisconsin Rapids, Wis	12	24	25	14.1	24
Portage, Wis	17	25	31	19.0	27
		2	2	10.5	2
Rock: Moline, Ill	10	7	9	10.4	8
		12	22	11.0	15
Iowa:					
Iowa City, Iowa	8	9	12	9.8	11
Wapello, Iowa	10	11	13	11.0	12
Illinois:					
Peru, Ill	17	11	17	18.1	12
		22	30	18.0	26–27
Peoria, Ill	18	13	Apr. 3	18.85	28
Havana, Ill	14	Feb. 26	(1)	16.1	28–31
Beardstown, Ill	14	Feb. 27	(1)	16.6	17–20
Bourbeuse: Union, Mo	12	12	14	14.8	13
Meramec:					
Pacific, Mo	11	12	16	22.6	14
Valley Park, Mo	14	12	16	27.8	14
Ohio Basin					
Monongahela:					
Lock No. 15, Hoult, W. Va	22	12	12	24.2	12
Lock No. 7, Greensboro, Pa	30	12	13	34.3	12
Lock No. 4, Pa	30	12	13	32.1	13
Little Kanawha:					
Glenville, W. Va	23	12	13	25.5	12
Creston, W. Va	20	12	13	23.4	12
Gauley: Summersville, W. Va	10	12	13	13.9	12
		24	24	13.7	24
Licking: Farmers, Ky	25	13	13	25.67	13
North Fork:					
Hazard, Ky	20	12	12	22.3	12
Jackson, Ky	28	12	13	36.0	13
Kentucky:					
Lock No. 7, High Bridge, Ky	30	12	15	33.2	12
Lock No. 4, Frankfort, Ky	31	13	16	33.3	13
Barren: Bowling Green, Ky	20	12	16	29.9	14
		27	30	23.3	29
Green:					
Lock No. 6, Brownsville, Ky	28	12	17	41.5	14
Lock No. 4, Woodbury, Ky	33	12	20	46.1	15
		27	(1)	38.6	29
Lock No. 2, Rumsey, Ky	34	12	(1)	42.5	21
West Fork: Edwardsport, Ind	12	13	16	15.4	14
		26	27	14.2	27
White:					
Petersburg, Ind	16	14	17	16.9	16
		27	29	18.1	28
Hazleton, Ind	16	14	18	17.5	16
		27	31	18.4	29
Wabash:					
Terre Haute, Ind	14	13	13	14.0	13
Mount Carmel, Ill	16	14	19	17.6	17
		29	30	16.3	30
Cumberland:					
Williamsburg, Ky	19	13	14	23.05	13
Burnside, Ky	50	13	13	50.6	13
Celina, Tenn	28	12	18	43.7	16
		26	(1)	40.4	29
Carthage, Tenn	40	14	16	42.0	15
Nashville, Tenn	40	16	20	41.9	18
Clarksville, Tenn	46	14	21	47.2	20
Lock F, Eddyville, Ky	50	14	29	57.9	22
		31	(1)	(1)	(1)
North Fork: Mendota, Va	8	26	26	9.9	26
South Fork: Bluff City, Tenn	12	26	26	12.5	26
Holston: Rogersville, Tenn	13	26	27	18.5	27
Newport, Tenn	6	12	12	6.5	12
		25	25	6.0	25
Nolichucky: Embreeville, Tenn	8	26	26	10.8	26
French Broad:					
Oldtown, Tenn	6	26	26	9.1	26
Dandridge, Tenn	12	26	27	16.6	26
Little Tennessee: McGhee, Tenn	18	13	13	18.3	13
Clinch: Clinton, Tenn	26	27	27	27.5	27
Elk: Fayetteville, Tenn	14	12	15	18.5	14
Tennessee:					
Knoxville, Tenn	20	26	28	23.7	27
Bridgeport, Ala	18	14	17	21.0	15
		29	30	19.7	30
Widow's Bar Dam, Ala	26	14	17	29.6	16
		29	31	28.2	30
Guntersville, Ala	25	15	18	29.0	17
		31	Apr. 1	26.3	31
Riverton Lock, Ala	33	13	20	36.8	17

Table of flood stages in March 1935—Continued

River and station	Flood stage	Above flood stages—dates From—	To—	Crest Stage	Date
Ohio:	*Feet*			*Feet*	
Pittsburgh, Pa	25	12	13	26.3	13
Dam No. 6, Beaver, Pa	30	13	14	31.9	13
Dam No. 25, near Addison, Ohio	43	15	16	46.8	14
Point Pleasant, W. Va	40	13	16	43.6	14
Dam No. 26, near Chambersburg, Ohio	50	15	15	50.0	15
Dam No. 29, near Ashland, Ky	50	14	16	53.9	14
Dam No. 30, near Greenup, Ky	52	14	16	53.7	15
Portsmouth, Ohio	50	15	16	51.1	15
Dam No. 33, near Maysville, Ky	50	15	16	51.1	16
Dam No. 35, New Richmond, Ohio	48	16	17	48.4	16
Cincinnati, Ohio	52	16	17	52.4	16
Dam No. 37, Fernbank Ohio	50	16	18	51.6	16
Dam No. 38, near Grant, Ky	51	17	17	51.0	17
Madison, Ind	46	17	17	46.0	17
Dam No. 41, Louisville, Ky	51	16	19	52.9	18
Dam No. 43, Evans Landing, Ind	55	16	19	57.8	18
Dam No. 44, Leavenworth, Ind	50	15	21	57.6	18
Dam No. 45, Addison, Ky	47	16	20	50.3	18
Dam No. 46, Owensboro, Ky	41	17	21	42.4	19
Dam No. 47, Newburgh, Ind	38	13	24	45.0	19
		29	(1)	(1)	(1)
Evansville, Ind	35	13	25	42.9	20
		28	(1)	(1)	(1)
Dam No. 48, near Henderson, Ky	38	14	25	44.8	20
		31	(1)	(1)	(1)
Dam No. 49, near Uniontown, Ky	37	15	28	44.1	22
		30	(1)	(1)	(1)
Dam No. 50, Fords Ferry, Ky	34	13	(1)	47.1	22
Dam No. 51, Golconda, Ill	40	16	27	45.0	22
Dam No. 52, Brookport, Ill	37	13	(1)	47.3	23
Dam No. 53, near Mound City, Ill	42	12	(1)	52.1	23
Cairo, Ill	40	12	(1)	49.9	23
White Basin					
Black:					
Leeper, Mo	11	11	12	18.8	11
Poplar Bluff, Mo	14	11	15	19.1	12
Black Rock, Ark	14	11	(1)	26.7	12
White:					
Cotter, Ark	21	12	14	35.2	13
Calico Rock, Ark	18	11	15	41.8	12
		25	26	19.9	25
Batesville, Ark	23	11	16	38.6	13
		25	28	26.7	25
Newport, Ark	26	13	Apr. 1	33.7	14
Georgetown, Ark	21	13	(1)	31.3	18
Clarendon, Ark	26	16	(1)	33.7	26
Arkansas Basin					
Neosho: Fort Gibson, Okla	22	13	14	24.0	13
Petit Jean: Danville, Ark	20	5	8	22.8	6
		11	15	26.2	12
		22	26	26.7	23

Table of flood stages in March 1935—Continued

River and station	Flood stage	Above flood stages—dates From—	To—	Crest Stage	Date
Arkansas:	*Feet*			*Feet*	
Webbers Falls, Okla	23	13	14	24.5	13
Fort Smith, Ark	22	13	15	25.4	14
		25	27	24.1	26
Van Buren, Ark	22	13	15	25.4	14
		25	27	24.0	26
Ozark, Ark	22	15	15	22.1	15
Dardanelle, Ark	22	15	15	22.5	15
Morrilton, Ark	20	14	16	21.6	15
		26	28	22.3	27
Red Basin					
Ouachita:					
Arkadelphia, Ark	17	5	5	13.2	12
		12	13	19.6	12
Camden, Ark	26	15	19	29.0	16
Sulphur:					
Ringo Crossing, Tex	20	5	7	23.2	5
Naples, Tex	22	10	15	23.6	12
Lower Mississippi Basin					
Big Lake Outlet: Manila, Ark	10	Jan. 3	2	1 6.8	Jan. 28–29
		10	(1)	19.4	22–24
St. Francis:					
Fisk, Mo	20	11	18	27.0	12
St. Francis, Ark	18	11	(1)	28.2	15
St. Francis Lock, Ark	27	21	(1)	29.2	25–27
Parkin, Ark	28	30	(1)	(1)	(1)
Madison, Ark	32	29	(1)	(1)	(1)
Tallahatchie: Swan Lake, Miss	26	Jan. 10	(1)	34.1	Jan. 31
				31.6	17
Yazoo:					
Greenwood, Miss	35	16	24	35.6	20
Yazoo City, Miss	29	5	(1)	(1)	(1)
Mississippi:					
New Madrid, Mo	34	13	(1)	39.9	23–24
Memphis, Tenn	34	21	(1)	37.2	28
Helena, Ark	39	18	(1)	(1)	(1)
Arkansas City, Ark	42	22	(1)	(1)	(1)
Greenville, Miss	36	23	(1)	(1)	(1)
Atchafalaya Basin					
Atchafalaya: Atchafalaya, La	22	15	(1)	(1)	(1)

[1] Continued into April.

WEATHER OF THE ATLANTIC AND PACIFIC OCEANS

[The Marine Division, W. F. McDONALD in Charge]

NORTH ATLANTIC OCEAN, MARCH 1935

By H. C. HUNTER

Atmospheric pressure.—From Maine to Iceland and the Azores the average pressure for March was moderately subnormal with the maximum deficiency, about 0.20 inch, over Davis Strait. Elsewhere over the North Atlantic and adjacent shores the pressure averaged higher than normal, the greatest excess, 0.33 inch, occurring over the Shetlands, and pressures 0.10 or less above normal over the eastern United States. The period from 9th to 11th was marked by especially high pressure over substantially all the ocean north of 30° latitude, except near southern Greenland.

The highest reported reading from a vessel was 30.71 inches on the 12th by the American steamship *Cliffwood*, when a short distance northwest of Scotland. The station at Lerwick, Shetland Islands, noted still higher pressures daily from the 9th to the 12th, while some coast stations of Norway had higher than 30.90 inches on the 9th.

The lowest reading noted by a vessel was 28.51 inches, on the American steamship *Quaker City*, at 3 p. m. the 17th, in latitude 55° N., longitude 28° W.

TABLE 1.—*Averages, departures, and extremes of atmospheric pressure (sea level) at selected stations for the North Atlantic Ocean and its shores, March 1935*

Station	Average pressure	Departure	Highest	Date	Lowest	Date
	Inches	*Inch*	*Inches*		*Inches*	
Julianehaab, Greenland	29.50	.....	30.00	26	28.99	7
Reykjavik, Iceland	29.67	−0.01	30.30	11	28.87	1
Larwick, Shetland Islands	30.03	+.33	30.88	9	29.28	23
Valencia, Ireland	30.11	+.21	30.54	12	29.17	1
Lisbon, Portugal	30.11	+.11	30.41	3	29.76	15
Madeira	30.10	+.09	30.43	1	29.83	26
Horta, Azores	30.09	−.09	30.45	1	29.79	17
Belle Isle, Newfoundland	29.61	−.19	30.14	9	28.88	26
Halifax, Nova Scotia	29.91	−.05	30.46	9	29.24	24
Nantucket	30.00	+.05	30.64	9	29.31	13
Hatteras	30.12	+.08	30.59	9	29.46	26
Bermuda	30.17	+.03	30.46	10	29.54	26
Turks Island	30.10	+.08	30.17	11	29.93	26
Key West	30.10	+.05	30.39	1	29.86	27
New Orleans	30.08	+.04	30.51	1	29.69	12

NOTE.—All data based on a. m. observations only, with departures compiled from best available normals related to time of observation, except Hatteras, Key West, Nantucket, and New Orleans, which are 24-hour corrected means.

Cyclones and gales.—Gales were numerous, though not so many as in each of the 3 next preceding months. Only 1 report of force 12 during March has come to hand, and only 7 of force 11.